12-30-04

AF/3627

ATTORNEY DOCKET NO.
020431.0671

PATENT APPLICATION
USSN 09/528,457

In The United States Patent and Trademark Office
On Appeal From The Examiner To The Board
of Patent Appeals and Interferences

In re Application of:	Mukesh Dalal
Serial No.:	09/528,457
Date Filed:	March 17, 2000
Confirmation No.:	4373
Group Art Unit:	3627
Examiner:	Steven B. McAllister
For:	*System and Method for Multi-Party Constrained Optimization*

CERTIFICATE OF MAILING
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Willie Jiles

Willie Jiles

Date: December 27, 2004

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Commissioner for Patents
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Alexandria, Virginia 22313-1450

Dear Sir:

Appeal Brief

Appellant has appealed to the Board of Patent Appeals and Interferences (the "Board") from the decision of the Examiner mailed January 27, 2004, finally rejecting all pending Claims 1-3, 5-7, 10-15, 17-19, 21-23, 26-31, 33-35, 37-39, and 42-63. Appellant filed a Notice of Appeal on July 26, 2004. Appellant respectfully submits this Appeal Brief with the statutory fee of $500.00, along with a three-month extension fee of $1,020.00.

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Real Party in Interest

This Application is currently owned by i2 Technologies US, Inc., as indicated by:

an Assignment recorded on March 17, 2000, from the inventors to i2 Technologies, Inc., in the Assignment Records of the United States Patent and Trademark Office ("PTO") at Reel 010698, Frames 0107-0108; and

an Assignment recorded on July 30, 2001, from i2 Technologies, Inc. to i2 Technologies US, Inc., in the Assignment Records of the PTO at Reel 012032, Frames 0151-0162.

Related Appeals and Interferences

No known appeals, interferences, or judicial proceedings are related to or will directly affect, be directly affected by, or have a bearing on the Board's decision regarding this Appeal. For completeness of the record, Appellant notes that a previous appeal of this Application was initiated by a Notice of Appeal mailed October 30, 2002. In response to the Appeal Brief filed in the previous appeal (*see* Appeal Brief mailed December 20, 2002), the Examiner reopened prosecution with an Office Action mailed March 26, 2003.

Status of Claims

Claims 1-3, 5-7, 10-15, 17-19, 21-23, 26-31, 33-35, 37-39, and 42-50 are pending in this Application, stand rejected pursuant to a Final Office Action mailed January 27, 2004 (the "Final Office Action"), and are all presented for appeal. Claims 51-63 were withdrawn from consideration without prejudice or disclaimer in a Response mailed November 10, 2003, in response to an Office Action containing a restriction requirement. All pending and withdrawn claims are shown in Appendix A, along with an indication of the status of those claims.

Status of Amendments

All amendments submitted by Appellant have been entered by the Examiner prior to the mailing of the Final Office Action.

Summary of Claimed Subject Matter

In certain embodiments, as illustrated in FIGURE 1, the present invention includes an example system 10 for solving one or more multi-party constrained optimization problems (MCOP). System 10 may include multiple parties 12 that are coupled to and communicate information related the MCOPs with broker 14 using associated broker links 16. Parties 12 may be individuals, business, or any other suitable entities that are each planning an activity that involves one or more other parties 12. Broker 14 is preferably an impartial individual, business, or other entity appropriate to communicate with the parties 12 to facilitate their negotiation of a sufficiently optimal solution to one or more associated MCOPs. Parties 12 may select broker 14 through a preliminary negotiation or in another suitable manner. Parties 12 communicate with one another using one or more party links 18. One or more rules governing the negotiation between parties 12, the authorized activities of broker 14, any commission payable to broker 14, and other suitable considerations may also be decided during a preliminary negotiation among parties 12, with or without interaction with broker 14. (*See* Page 5, Lines 2-16)[1]

As an example of a possible relationship between parties 12, if party 12a is a computer or other product manufacturer and party 12b is a computer chip or other component manufacturer, then parties 12a and 12b may jointly plan the procurement by party 12a of computer chips made by party 12b. Although two parties 12 are described, the present invention is equally applicable to situations involving any number of parties 12. Additionally, although a single broker 14 is discussed, multiple brokers 14 integral to or separate from one another may each interact with one or more parties 12. (*See* Page 5, Line 17 through Page 6, Line 2) Each party 12 and each broker 14 is associated with one or more computers 20 at one or more locations. Each party 12 and broker 14 may include one or more human users of system 10, one or more suitable software components operating on computers 20, or a combination of human users and software components suitable to carry out a negotiation, in whole or in part. (*See* Page 6, Lines 3-17)

[1] All citations in the "Summary of the Claimed Subject Matter" section of this Appeal Brief refer to Appellant's patent application as filed on March 17, 2000.

In a multi-party planning situation, each party 12 will typically have its own constrained optimization problem (COP): to maximize one or more objective functions with respect to one or more constrained decision variables. If the COPs of parties 12 share one or more decision variables, as is typical, then the COPs of parties 12 are not independent of one another. FIGURE 2 illustrates an example MCOP 30 involving parties 12a and 12b with corresponding COPs 32a and 32b, respectively. Each of the COPs 32 includes one or more objective functions 34 and one or more constraints 36 relating to a set of one or more global decision variables 38. Each COP 32 may be deterministic, stochastic (involving one or more random variables), or any appropriate combination of these. Rather than being explicitly formulated, one or more COPs 32 may be implicitly expressed or otherwise generated, for example, according to operation of computer software. An optimal solution to MCOP 30 includes an assignment of a value to each variable 38, such that all of the objectives 34 are optimized and all of the constraints 36 are satisfied. (*See* Page 6, Lines 18-31)

It is a goal of multi-party constrained optimization (MCO) according to the present invention to determine at least one fair Pareto-optimal global solution to non-independent optimization problems of parties 12 that parties 12 transmit to broker 14 using links 16. In one embodiment, these transmitted optimization problems may include all or only a portion of the objectives 34, constraints 36, and variables 38 of COPs 32. As a result, party 12 may withhold selected information from broker 14, in addition to refusing to share it with other parties 12. A global solution may be defined as a union of mutually consistent solutions to the transmitted optimization problems of all parties 12 to the negotiation. A global solution may be considered Pareto-optimal if no global solution is better with respect to any objective without also being worse with respect to at least one other objective. A global solution may be deemed fair if it does not provide an additional advantage to any party 12, according to one or more suitable criteria, beyond any rules parties 12 have previously agreed upon. (*See* Page 7, Lines 1-13)

In an example in which all COPs 32 share the same objectives 34, MCO reduces to traditional single party constrained optimization (CO), a simpler problem. This may arise when parties 12 are different organizations in a single business enterprise. (*See* Page 7, Lines 14-21) MCO becomes more difficult when the parties 12 do not trust each other or are

otherwise unwilling to share their COPs 32 with one another. This is typical when the parties 12 are independent business enterprises and their COPs 32 reflect proprietary information, the sharing of which could be harmful to the enterprises. The present invention provides an optimal solution to MCOP 30 without requiring that parties 12 share their respective COPs 32 or portions thereof with one another, which provides an important technical advantage. In addition, parties 12 need not share their entire COPs 32 even with broker 14, instead transmitting to broker 14 suitable optimization problems that may include only portions of COPs 32. Furthermore, the present invention supports dynamic MCO (DMCO), in which one or more parties 12 or one or more aspects of their COPs 32, such as one or more objectives 34 or one or more constraints 36, may change during the negotiation process. (*See* Page 7, Line 22 through Page 8, Line 2)

In the example MCOP illustrated in FIGURE 2, COPs 32a and 32b for parties 12a and 12b, respectively, reflect that there are two global decision variables 38 X and Y; that there is one objective 34 for each party 12 ("maximize X+Y" for party 12a and "minimize X+Y" for party 12b); and that there are multiple constraints 36 for each party 12. Note that the objective 34 "minimize X+Y" may be considered identical to the objective 34 "maximize – (X + Y)" if a corresponding threshold or other value is also consistently treated as oppositely signed. Since objectives 34a and 34b in this particular example are opposites of one another, every solution is Pareto-optimal. Although two extreme solutions exist in this example (X=0, Y=0 and X=32.5, Y=22.5) and define the ranges of X (0, 32.5) and Y (0, 22.5), one cannot specify all the solutions merely by indicating the ranges of these variables 38, because the optimal values of X and Y depend on one another. Further, a fair solution to the MCOP 30 may depend upon any rules that the parties 12 have previously agreed upon, as described below. (*See* Page 8, Lines 3-16)

In one embodiment, system 10 implements a brokered multi-party constrained optimization (BOMCO) technique involving parties 12 and broker 14 to obtain one or more solutions to MCOP 30. FIGURE 3 illustrates an example BOMCO process 50 involving three stages of negotiation between broker 14 and each party 12. The stages of BOMCO process 50 may include, singly or in any appropriate combination, without limitation: (1) a solution discovery stage 52 to generate a set of one or more global solutions 54; (2) a solution

filtering stage 56 to discard any unacceptable discovered global solutions 54 and generate a set of one or more filtered solutions 58; and (3) a solution selection stage 60 to select a single global solution 54 from among the filtered solutions 58 and generate a set of one or more selected solutions 62. The set of one or more global solutions 54 that have been discovered but not discarded are collectively referred to as the solutions pool 64, whether or not filtered or selected. (*See* Page 8, Lines 17-28)

In one embodiment, filtering stage 56 and selection stage 60 are optional. For example, filtering of an empty solutions pool 64 is not possible and is therefore inappropriate. One or more of the above stages 52, 56, and 60 may be repeated as appropriate. For example, discovery stage 52 may be repeated one or more times if the filtering stage 56 results in all of the discovered global solutions 54 being discarded. Discovery stage 52, filtering stage 56, selection stage 60, and any other suitable stages may each occur any suitable number of times and in any suitable order during the negotiation, as appropriate and according to particular needs. (*See* Page 8, Line 29 through Page 9, Line 5)

Discovery stage 52 may occur in multiple rounds, each generating one global solution 54 to the MCOP 30. In one embodiment, each round of the discovery stage 52 involves at least: (1) problem transmission from parties 12 to broker 14; (2) generation of at least one global solution 54 at broker 14 according to the problems transmitted; and (3) solution transmission from broker 14 to parties 12. For problem transmission, each party 12 transmits an optimization problem to the broker 14 that includes at least one objective 34 of COP 32. Together with or separate from their optimization problems, parties 12 each also communicate a threshold or other suitable value relating to each transmitted objective 34. Broker 14 may, instead or in addition to receiving a threshold value from a party 12, generate an optimal value according the optimization problem for party 12, to which solution values will be compared. The optimization problem transmitted from party 12 to broker 14 may but is not required to be the same as its COP 32. For solution generation, the broker 14 generates a linear program (LP) or other suitable formulation of the global optimization problem and then uses an associated LP solver or other solution generator to generate at least one global solution 54 to the global optimization problem. For solution transmission, broker 14 either transmits the global solution 54 to each party 12 or informs the parties 12 that no feasible

global solution 54 could be discovered. Termination of the discovery stage is determined according to previously agreed upon rules governing the negotiation, for example, after a specified number of global solutions 54 has been generated or one or more other criteria have been satisfied. (*See* Page 9, Lines 6-26)

In one embodiment, the global solution 54 transmitted to any party 12 should solve the optimization problem of that party 12 such that the resulting value of each transmitted objective 34 is not less than the corresponding threshold or otherwise inconsistent with the transmitted value to which it relates. In addition, global solutions 54 transmitted to parties 12 should be mutually consistent and, preferably, globally Pareto-optimal and fair. In one embodiment, it is undesirable to settle for a particular global solution 54 when another global solution 54 can do better than merely meeting transmitted thresholds or otherwise being consistent with transmitted values relating to objectives 34. Broker 14 may use one or more agreed-upon fairness criteria to fairly distribute such excess. In one embodiment, such criteria may include but are not limited to, in any suitable combination: (1) an equal distribution criterion; (2) a geometric distribution criterion; (3) a weighted distribution criterion; (4) a weighted geometric distribution criterion; and (5) a minimum deviation from optimal criterion. After using one or more of these fairness criteria, broker 14 may also perform one or more Pareto-optimality passes to achieve suitable Pareto-optimality (improving one or more objectives 34 of one party 12 without violating the objectives 34 of another party 12) based on a fixed or other suitable relative ranking of parties 12 themselves or that parties 12 have supplied as to the importance of each objective 34. The resulting global solution 54 is guaranteed to be Pareto-optimal. (*See* Page 9, Line 27 through Page 10, Line 13)

Using an equal distribution criterion, the values of objectives 34 for parties 12 must exceed their corresponding thresholds by the same amount. For example, if the thresholds for parties 12a and 12b are (10, 50), then both (20, 60) and (100, 140) are deemed fair, but (20, 100) is not. Using a geometric distribution criterion, the values of objectives 34 must exceed their corresponding thresholds by the same fraction. As an example, if the thresholds for parties 12a and 12b are (10, 50), then both (20, 100) and (15, 75) are deemed fair, but (20, 60) is not. Using a weighted distribution criterion, a previously agreed-upon, assigned, or

any other weight (typically a positive number) is associated with each party 12. The differences between the values of objectives 34 and the corresponding thresholds must be in the same ratio as their weights. For example, if the weights for parties 12a and 12b are (2, 1) and their thresholds are (10, 50), then both (20, 55) and (100, 95) are considered fair, but (20, 60) is not. Using a weighted geometric distribution criterion, the ratios of the values of objectives 34 to associated thresholds must be the same as their weights. As an example, if the weights for parties 12a and 12b are (3, 2) and the thresholds are (10, 50), then both (30, 100) and (60, 200) are fair, but (20, 100) is not. Using a minimum deviation from optimal criterion, instead of using thresholds, the optimal values of objectives 34 (which broker 14 may generate according to the transmitted optimization problems) are used while considering all the transmitted constraints 36 that relate to the objectives 34. Although these criteria are described with respect to thresholds, analogous criteria may be used with respect to optimal or other values relating to objectives 34. (*See* Page 10, Line 14 through Page 11, Line 2)

There are several effective approaches to filtering solutions pool 64 at filtering stage 56. In one embodiment, these approaches include, for example: (1) veto – any global solution 54 vetoed by any party 12 is discarded; (2) Pareto-optimal ranking – parties 12 rank global solutions 54 and all global solutions 54 lacking Pareto-optimal ranking are discarded; (3) optimal weighted preferences – each party 12 provides a value for each global solution 54 indicating the relative strength of its preference for that global solution 54, broker 14 determines all the global solutions 54 that maximize or otherwise optimize the total weight, and remaining global solutions 54 are discarded; and (4) mixed – for example, veto and optimal weighted preferences approaches may be mixed by treating any negative weights as vetoes. For the optimal weighted preference approach, if a fairness criterion used during discovery stage 52 incorporates different weights for different parties 12, then the weights are preferably considered. The present invention contemplates combining two or more of these or any other suitable approaches as appropriate. As for other aspects of the negotiation, one or more parties 12, broker 14, or parties 12 and broker 14 collectively will preferably have previously agreed on a filtering approach to be used. (*See* Page 11, Lines 3-18)

There are several approaches for selecting a solution from filtered solutions 58 at selection stage 60. In one embodiment, an auction may be performed in which each party 12

bids on the right to select a solution. The highest bidding party 12, who then selects the solution, pays money to other parties 12 according to the second highest bid. For example, the winning party 12 may pay the difference between its winning bid and the second highest bid, or some suitable factor multiplied by that difference. This money may be fairly distributed among the other parties 12 according to an appropriate distribution scheme, to parties 12 in proportion to their bids for example. Alternatively, for example, broker 14 may randomly select one filtered solution 58. If a fairness criterion used during discovery stage 52 incorporated different weights for parties 12, then the weights may be considered in selecting a filtered solution 58 at selection stage 60. As for other aspects of the negotiation, one or more parties 12, broker 14, or parties 12 and broker 14 will preferably have previously agreed on a selection approach to be used during selection stage 60. (*See* Page 11, Lines 19-32)

Continuing the example involving parties 12a and 12b, suppose that parties 12a and 12b have agreed on the following negotiation rules for use during the BOMCO process: (1) the negotiation will include only the discovery stage 52 (possibly involving multiple rounds); (2) the negotiation will end after one global solution 54 is discovered; (3) any excess will be equally distributed between parties 12a and 12b; and (4) the rounds of discovery stage 52 may differ only with respect to the thresholds or other values that parties 12 transmit, not with respect to the objectives 34 or constraints 36. In the first round of discovery stage 52, parties 12a and 12b transmit to broker 14 their respective optimization problems (e.g., COPs 32a and 32b in FIGURE 2), along with thresholds or other suitable values that correspond to objectives 34 included in the optimization problems. As described above, broker 14 may, instead or in addition to receiving a threshold from party 12, generate an optimal value according the optimization problem for the party 12, to which a solution value for party 12 are compared. (*See* Page 12, Lines 1-14)

Using thresholds for purpose of explanation, given a first threshold T_1 for party 12a and a second threshold T_2 for party 12b, broker 14 may generate and solve the following linear program for which one goal is to maximize any excess and to distribute it equally between parties 12a and 12b such that each party 12 will get $E_1=E_2=E$ of the excess:

Maximize E such that $2X + Y \geq 100$,

$X - Y \leq 10$,

$X + 3Y \geq 100$,

$X + Y - E \geq T_1$,

$X + Y + E \geq T_2$,

$X \geq 0$, and

$Y \geq 0$

This formulation is merely an example, and the present invention is intended to encompass any appropriate linear program or other global optimization problem reflecting information transmitted from parties 12 to broker 14. Using this formulation, broker 14 generates a global solution 54 according to the thresholds received from parties 12. If parties 12 each transmit more than one threshold, a primary or more desirable threshold and a secondary or less desirable threshold for example, broker 14 may generate more than one corresponding global solution 54. Parties 12 may transmit any number of thresholds or other values to broker 14, according to particular needs, and broker 14 may generate in response multiple corresponding global solutions 54, serially, substantially simultaneously, or in any other appropriate manner. (*See* Page 12, Line 15 through Page 13, Line 7)

FIGURE 4 is a table 70 containing example values 72 and 74 of variables 38 X and Y, respectively, and an objective value 76 (the determined global solution 54) for several threshold pairs 78 for this particular example involving parties 12a and 12b. Under the example rules described above, and assuming the thresholds pairs 78 are transmitted and operated on at broker 14 in the order listed in table 70 during discovery stages 52 of multiple negotiations 80, the objective values 76 are determined as shown. In this example, objective values 76 have a range (0, 55), which are the global minimum and maximum, respectively, for objective values 76 among all of the global solutions 54. (*See* Page 13, Lines 8-15)

FIGURE 5 illustrates an example method for solving an MCOP 30. Certain steps of the method may occur serially, in any relative order, or substantially simultaneously, as described more fully in the Specification. At step 100, two or more parties 12 to a negotiation agree on rules governing the negotiation, with or without the participation of

broker 14. These rules may be standardized rules, rules customized for the particular parties 12, or any suitable combination of these. In one embodiment, agreeing on the rules governing the negotiation may include agreeing on, in any appropriate combination and without limitation: (1) the identity of broker 14 and any issues relating to the participation of broker 14 (e.g., compensation of broker 14); (2) whether Pareto-optimality will be sought with respect to one or more global solutions 54; (3) how the end of discovery stage 52 is to be determined; (4) the number of rounds for discovery stage 52; (5) the number of global solutions 54 to be generated in each round of discovery stage 52; (6) whether and how one or more rules may vary from round to round in discovery stage 52; (7) one or more fairness criteria governing distribution of any excess; (8) whether and how one or more weights are to be associated with each party 12 for distributing any excess according to the fairness criterion used; (9) whether broker 14 will perform one or more Pareto-optimality passes; (10) whether one or more filtering stages 56 will be used; (11) a filtering approach to be used at filtering stage 56 and any rules associated with that filtering approach; (12) whether one or more selection stages 60 will be used; (13) a selection approach to be used at selection stage 60 and any rules associated with that selection approach; and (14) any other issues appropriate for agreement among the parties 12. (*See* Page 13, Line 16 through Page 14, Line 4)

At step 102, parties 12 determine their COPs 32, including determining one or more objectives 34 and one or more constraints 36 relating in some suitable manner to one or more global variables 38. At step 104, parties 12 determine their optimization problems for transmission to broker 14. The optimization problem for a party 12 may include any suitable portion of corresponding COP 32 that includes at least one objective 34. At step 106, parties 12 determine one or more thresholds or other values for transmission to broker 14, each value relating to a particular objective 34 in the optimization problem. (*See* Page 14, Lines 5-13) Discovery stage 52 may begin at step 108, where the parties 12 transmit the respective optimization problems to broker 14. At step 110, each party 12 transmits to broker 14 one or more thresholds or other values relating to the objectives 34 within its transmitted optimization problem. (*See* Page 14, Lines 14-23)

At step 112, broker 14 generates a linear program or other suitable formulation of the global optimization problem according to the multiple optimization problems and values

received from parties 12 and, at step 114, generates a corresponding global solution 54. As part of or separate from discovering the global solution 54, broker 14 determines whether any excess exists at step 116 and, at step 118, distributes any such excess among parties 12 according to one or more previously agreed-upon or other suitable fairness criteria. Broker 14 may also perform one or more Pareto-optimality passes at step 120, as part of or separate from determining the global solution 54, to achieve Pareto-optimality. Broker 14 transmits global solution 54 to parties 12 at step 122. In one embodiment, if a next round of discovery stage 52 is to be performed at step 124, the method returns to step 110, where parties 12 may transmit new thresholds or other values to the broker 14. Otherwise, discovery stage 52 ends, filtering stage 56 may begin if desired, and the method proceeds to step 126, where parties 12 transmit suitable filtering information to broker 14 according to a previously agreed-upon or other filtering approach. (*See* Page 14, Line 24 through Page 15, Line 6)

At step 128, broker 14 uses the selected filtering approach to determine one or more filtered solutions 58 according to appropriate rules. Broker 14 then transmits to, identifies for, or otherwise communicates to parties 12 the filtered solutions 58 at step 130 and filtering stage 56 ends. Selection stage 60 may begin at step 132, where the parties 12 transmit selection information to broker 14 according to a previously agreed-upon or other suitable selection approach. At step 134, broker 14 uses the appropriate selection approach to determine a selected solution 62 according to appropriate rules. Broker 14 then transmits to, identifies for, or otherwise communicates to parties 12 the selected solution 62 at step 136, selection stage 60 ends, and the method ends. (*See* Page 15, Lines 7-15)

Discovery stage 52, filtering stage 56, and selection stage 60 may occur any suitable number of times, and each such stage 52, 56, or 60 may occur in any appropriate order relative to any other such stage 52, 56, or 60. For example, parties 12 may agree that filtering stage 56 and selection stage 60 will occur after a specified number of global solutions 54 are discovered at discovery stage 52, while allowing for the possibility of another discovery stage 52 if the results of such filtering and selection are considered inadequate for some reason. Furthermore, one or more parties 12 may change during the negotiation, one or more aspects of their COPs 32 or their associated objectives 34, constraints 36, transmitted optimization problems, or thresholds or other values may change during the negotiation, or any other suitable aspect of an

MCO scenario may change during the negotiation. The present invention is highly flexible to accommodate these changes, for example, allowing one or more stages 52, 56, or 60 to be repeated as appropriate and providing appropriate safeguards such that the interests of all parties 12 may be served. (*See* Page 15, Lines 16-30)

Grounds of Rejection to be Reviewed on Appeal

1. Are Claims 1-3, 5-7, 10-15, 17-19, 21-23, 26-31, 33-35, 37-39, and 42-50 patentable under 35 U.S.C. § 103(a) over the Examiner's proposed combination of U.S. Patent 5,950,177 to Lupien, et al. ("*Lupien*") and U.S. Patent 5,495,412 to Thiessen ("*Thiessen*"), with *Lupien* as the primary reference?

2. Are Claims 1-3, 5-7, 10-15, 17-19, 21-23, 26-31, 33-35, 37-39, and 42-50 patentable under 35 U.S.C. § 103(a) over the Examiner's proposed combination of *Thiessen* and *Lupien*, with *Thiessen* as the primary reference?

Grouping of Claims

Appellant has made an effort to group claims to reduce the burden on the Board. In the Argument section of this Appeal Brief, where appropriate, Appellant presents arguments as to why particular claims subject to a ground of rejection are separately patentable from other claims subject to the same ground of rejection. To reduce the number of groups and thereby reduce the burden on the Board, Appellant does not argue individually every claim that recites patentable distinctions over the references cited by the Examiner, particularly in light of the clear allowability of Appellant's independent claims. The claims of each group provided below may be deemed to stand or fall together for purposes of this Appeal.

Appellant has concluded that the claims may be grouped together as follows:

With regard to each ground of rejection identified above (issues 1 and 2), the claims subject to that ground of rejection may be grouped together as follows for purposes of this Appeal:

1. Group 1 may include independent Claims 1, 17, and 33 and dependent Claims 2-3, 5-7, 10, 15, 18-19, 21-23, 26, 31, 34-35, 37-39, 42, and 47;

2. Group 2 may include dependent Claims 11-12, 27-28, and 43-44, which depend from independent Claims 1, 17, and 33, respectively; and

3. Group 3 may include dependent Claims 13-14 and 48, dependent Claims 29-30 and 49, and dependent Claims 45-46 and 50, which depend from independent Claims 1, 17, and 33, respectively.

Argument

The rejection of Claims 1-3, 5-7, 10-15, 17-19, 21-23, 26-31, 33-35, 37-39, and 42-50 under 35 U.S.C. § 103(a) as being unpatentable over the proposed *Lupien-Thiessen* combination (with *Lupien* as the primary reference) is improper and should be reversed by the Board. The rejection of Claims 1-3, 5-7, 10-15, 17-19, 21-23, 26-31, 33-35, 37-39, and 42-50 under 35 U.S.C. § 103(a) as being unpatentable over the proposed *Thiessen-Lupien* combination (with *Thiessen* as the primary reference) is improper and should be reversed by the Board.

I. The Claims are Patentable over the Proposed *Lupien-Thiessen* Combination

A. Overview

Claims 1-3, 5-7, 10-15, 17-19, 21-23, 26-31, 33-35, 37-39, and 42-50 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the Examiner's proposed *Lupien-Thiessen* combination, with *Lupien* as the primary reference. A copy of *Lupien* is attached as Appendix B, and a copy of *Thiessen* is attached as Appendix C. Appellant respectfully submits that the Examiner's proposed *Lupien-Thiessen* combination fails to support the obviousness rejections of Claims 1-3, 5-7, 10-15, 17-19, 21-23, 26-31, 33-35, 37-39, and 42-50. Appellant respectfully submits that these rejections are therefore improper and should be reversed by the Board.

B. Standard

The question raised under 35 U.S.C. § 103 is whether the prior art taken as a whole would suggest the claimed invention taken as a whole to one of ordinary skill in the art at the time of the invention. *See* 35 U.S.C. § 103(a). Accordingly, even if all elements of a claim are disclosed in various prior art references, which is certainly not the case here as discussed below, the claimed invention taken as a whole cannot be said to be obvious without some reason given in the prior art why one of ordinary skill at the time of the invention would have been prompted to modify the teachings of a reference or combine the teachings of multiple references to arrive at the claimed invention.

The M.P.E.P. sets forth the strict legal standard for establishing a *prima facie* case of obviousness based on modification or combination of prior art references. "To establish a

prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references where combined) must teach or suggest all the claim limitations." M.P.E.P. § 2142, 2143. The teaching, suggestion, or motivation for the modification or combination and the reasonable expectation of success must both be found in the prior art and cannot be based on an applicant's disclosure. *See Id.* (citations omitted). "Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art" at the time of the invention. M.P.E.P. § 2143.01. Even the fact that references *can* be modified or combined does not render the resultant modification or combination obvious unless the prior art teaches or suggests the desirability of the modification or combination. *See Id.* (citations omitted). Moreover, "To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. All words in a claim must be considered in judging the patentability of that claim against the prior art." M.P.E.P. § 2143.03 (citations omitted).

The governing Federal Circuit case law makes this strict legal standard even more clear.[2] According to the Federal Circuit, "a showing of a suggestion, teaching, or motivation to combine or modify prior art references is an essential component of an obviousness holding." *In re Sang-Su Lee*, 277 F.3d 1338, 1343, 61 U.S.P.Q.2d 1430, 1433 (Fed. Cir. 2002) (quoting *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1124-25, 56 U.S.P.Q.2d 1456, 1459 (Fed. Cir. 2000)). "Evidence of a suggestion, teaching, or motivation . . . may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, the nature of the problem to be solved." *In re Dembiczak*, 175 F.3d 994, 999, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999). However, the "range of sources available . . . does not diminish the requirement for actual evidence." *Id.* Although a prior art device "may be capable of being modified to run the way the apparatus is

[2] Note M.P.E.P. 2145 X.C. ("The Federal Circuit has produced a number of decisions overturning obviousness rejections due to a lack of suggestion in the prior art of the desirability of combining references.").

claimed, there must be a suggestion or motivation in the reference to do so." *In re Mills*, 916 F.2d at 682, 16 U.S.P.Q.2d at 1432. *See also In re Rouffet,* 149 F.3d 1350, 1357, 47 U.S.P.Q.2d 1453, 1457-58 (Fed. Cir. 1998) (holding a *prima facie* case of obviousness not made where the combination of the references taught every element of the claimed invention but did not provide a motivation to combine); *In Re Jones*, 958 F.2d 347, 351, 21 U.S.P.Q.2d 1941, 1944 (Fed. Cir. 1992) ("Conspicuously missing from this record is any evidence, other than the PTO's speculation (if that can be called evidence) that one of ordinary skill in the herbicidal art would have been motivated to make the modification of the prior art salts necessary to arrive at" the claimed invention.). Even a determination that it would have been obvious to one of ordinary skill in the art at the time of the invention to try the proposed modification or combination is not sufficient to establish a *prima facie* case of obviousness. *See In re Fine*, 837 F.2d 1071, 1075, 5 U.S.P.Q .2d 1596, 1599 (Fed. Cir. 1988).

In addition, the M.P.E.P. and the Federal Circuit repeatedly warn against using an applicant's disclosure as a blueprint to reconstruct the claimed invention. For example, the M.P.E.P. states, "The tendency to resort to 'hindsight' based upon applicant's disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art." M.P.E.P. § 2142. The governing Federal Circuit cases are equally clear. "A critical step in analyzing the patentability of claims pursuant to [35 U.S.C. § 103] is casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field. . . . Close adherence to this methodology is especially important in cases where the very ease with which the invention can be understood may prompt one 'to fall victim to the insidious effect of a hindsight syndrome wherein that which only the invention taught is used against its teacher.'" *In re Kotzab,* 217 F.3d 1365, 1369, 55 U.S.P.Q.2d 1313, 1316 (Fed. Cir. 2000) (citations omitted). In *In re Kotzab*, the Federal Circuit noted that to prevent the use of hindsight based on the invention to defeat patentability of the invention, the court requires the Examiner to show a sufficient motivation in the prior art to combine the references that allegedly create the case of obviousness. *See id. See also, e.g., Grain Processing Corp. v. American Maize-Products,* 840 F.2d 902, 907, 5 U.S.P.Q.2d 1788, 1792 (Fed. Cir. 1988). Similarly, in *In re Dembiczak*, the Federal Circuit

reversed a finding of obviousness by the Board, explaining that the required evidence of such a teaching, suggestion, or motivation is essential to avoid impermissible hindsight reconstruction of an applicant's invention:

> Our case law makes clear that the best defense against the subtle but powerful attraction of hind-sight obviousness analysis is *rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references*. Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability—the essence of hindsight.

175 F.3d at 999, 50 U.S.P.Q.2d at 1617 (emphasis added) (citations omitted).

C. Group 1 (Claims 1, 2-3, 5-7, 10, 15, 17-19, 21-23, 26, 31, 33-35, 37-39, 42, and 47)

Claims 1, 2-3, 5-7, 10, 15, 17-19, 21-23, 26, 31, 33-35, 37-39, 42, and 47 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the proposed *Lupien-Thiessen* combination. Appellant respectfully submits that these claims are clearly patentable over the proposed *Lupien-Thiessen* combination. Thus, Appellant respectfully submits that these rejections are improper and should be reversed by the Board.

Claims 1, 2-3, 5-7, 10, 15, 17-19, 21-23, 26, 31, 33-35, 37-39, 42, and 47 are separately patentable from every other claim subject to the same ground of rejection. These claims recite limitations that are substantially different from limitations recited in other claims. In addition, claims excluded from Group 1 that are subject to the same ground of rejection and that depend on independent Claims 1, 17, and 33, respectively, recite patentable distinctions over the prior art beyond those recited in independent Claims 1, 17, and 33 and cannot be properly grouped with independent Claims 1, 17, and 33 for purposes of this Appeal.

Appellant respectfully submits that the Examiner's proposed *Lupien-Thiessen* combination fails to support the obviousness rejections for at least two reasons. First, assuming that the proposed *Lupien-Thiessen* combination was proper, the proposed combination would still fail to disclose, teach, or suggest each and every limitation recited in

the rejected claims. Second, the proposed *Lupien-Thiessen* combination is improper at least because the Examiner has not shown the required teaching, suggestion, or motivation in the prior art to combine *Thiessen* with *Lupien* in the manner the Examiner proposes.

1. The Proposed *Lupien-Thiessen* Combination Fails to Disclose, Teach, or Suggest Various Limitations Recited in Appellant's Claims

Appellant respectfully submits that the proposed *Lupien-Thiessen* combination fails to disclose, teach, or suggest various limitations recited in Appellant's claims. Appellant discusses independent Claim 1 as an example.

For example, the proposed *Lupien-Thiessen* combination fails to disclose, teach, or suggest at least the following limitations recited in Claim 1:

> ***the global solution representing a first excess between the first objective value and the first threshold value and a second excess between the second objective value and the second threshold value, the global solution being generated considering a fairness criterion specifying one of the following:***
>
> ***that the first excess must equal the second excess, the fairness criterion comprising an equal distribution criterion;***
>
> ***that a ratio of the first excess to the second excess must equal a ratio of the first threshold value to the second threshold value, the fairness criterion comprising a geometric distribution criterion;***
>
> ***that a ratio of the first excess to the second excess must equal a ratio of a first weight for the first party to a second weight for the second party, the fairness criterion comprising a weighted distribution criterion; and***
>
> ***that a ratio of the first objective value to the first threshold value must equal a first weight for the first party and a ratio of the second objective value to the second threshold value must equal a second weight for the second party, the fairness criterion comprising a weighted geometric distribution criterion.***

The Examiner acknowledges that *Lupien* does not "show an option for dividing the excess satisfaction in one of the four claimed methods." (Final Office Action, Pages 2-3) However, the Examiner argues that *Thiessen* "shows dividing excess satisfaction to create equal satisfaction distribution." (*See* Final Office Action, Page 3) Appellant respectfully submits that *Thiessen* fails to make up for the acknowledged deficiencies of *Lupien*.

In fact, *Thiessen* even fails to disclose, teach, or suggest "***the global solution representing a first excess between the first objective value and the first threshold value and a second excess between the second objective value and the second threshold value, the global solution being generated considering a fairness criterion***" specifying the manner in which the first and second excesses are to be distributed between the parties, as recited in Claim 1. As disclosing these limitations, the Examiner stated, without citation to any particular portion of *Thiessen*, that "Thiessen shows dividing excess satisfaction to create equal satisfaction distribution." (Final Office Action, Page 3) Appellant assumes that the Examiner was referring to Column 10, Lines 23-26 of *Thiessen*, which merely discloses generating "an equivalent alternative" as a set of values "that will provide each party with the same total satisfaction" in absolute terms.[3] However, nowhere does this portion, nor any other portion of *Thiessen*, disclose anything regarding excesses corresponding to thresholds which are to be fairly distributed to the parties according to a particular fairness criterion. Thus, contrary to the Examiner's assertion, *Thiessen* necessarily fails to disclose, teach, or suggest "the global solution being generated considering a fairness criterion specifying . . . ***that the first excess must equal the second excess***, the fairness criterion comprising an equal distribution criterion," as recited in Claim 1, much less any other fairness criterion recited in Claim 1.

Appellant presented substantially similar arguments in response to the Office Action mailed March 26, 2003. However, in the Final Office Action the Examiner did not provide any substantive response to this argument, but instead merely stated, without citation, that "Thiessen shows dividing excess satisfaction to create equal satisfaction distribution." (Final Office Action, Page 3) Appellant maintains that *Thiessen* fails to disclose, teach, or suggest these limitations and thus fails to make up for the acknowledged deficiencies of *Lupien*.

Furthermore, it is not at all clear that *Lupien* discloses, teaches, or suggests even the most basic elements recited in Claim 1. For example, the Examiner appears to equate "stock

[3] Appellant's assumption is based on the Examiner's rejection in the Office Action mailed March 26, 2003, of then-pending dependent Claims 24-25, which substantially corresponded to then-pending dependent Claims 8-9 and 40-41. In response to that Office Action, independent Claims 1, 17, and 33 were amended to incorporate certain limitations recited in these dependent claims. Curiously, however, the Examiner did not cite any particular portion of *Thiessen* in rejecting these amended portions of independent Claims 1, 17, and 33 in the Final Office Action. (*See* Final Office Action, Page 3)

price" as disclosed in *Lupien* with the one or more first constraints and the one or more second constraints recited in Claim 1. (*See* Final Office Action, Page 2) Appellant respectfully submits that this equation is inappropriate. Stock price (e.g., as shown on the y-axis of at least Figures 2 and 3A-3D of *Lupien* and as disclosed throughout *Lupien*) is not a constraint; it is merely a variable that may be used to ***create*** a constraint. Similarly, quantity (e.g., as shown on the x-axis of at least Figures 2 and 3A-3D of *Lupien* and as disclosed throughout *Lupien*) is not a constraint; it is merely a variable that may be used to ***create*** a constraint. The Examiner refers to Figure 3 of *Lupien* to support the equation of stock price as disclosed in *Lupien* with the constraints recited in Claim 1. However, the only constraint reflected in Figures 3A-3D of *Lupien* is one ***created using*** stock price (i.e. that stock price be less than or greater than some value for a given quantity to achieve an acceptable level of satisfaction). That constraint (that stock price be less than or greater than some value for a given quantity) simply devolves into a threshold value of price, given a quantity, to achieve an acceptable level of satisfaction. In contrast, Appellant's Claim 1 recites constraints distinct from threshold values. For example, Claim 1 recites in part:

- a first optimization problem and a first threshold value corresponding to a first party to a negotiation, the first optimization problem comprising at least one first objective to which the first threshold relates and one or more first constraints to which the at least one first objective relates; and
- a second optimization problem and a second threshold value corresponding to a second party to a negotiation, the second optimization problem comprising at least one second objective to which the second threshold relates and one or more second constraints to which the at least one second objective relates.

As the above discussion shows, *Lupien* clearly fails to disclose, teach, or suggest constraints distinct from threshold values in the manner recited in Claim 1. Thus, the Examiner's attempted equation of stock price as disclosed in *Lupien* with the one or more first constraints and the one or more second constraints recited in Claim 1 is clearly inappropriate.

As a result of these deficiencies of *Lupien*, *Lupien* also necessarily fails to disclose, teach, or suggest, at a minimum, generating "a global solution to a global optimization problem, the global solution comprising a first objective value for the at least one first objective and a second objective value for the at least one second objective such that the first

and second objective values are consistent with value the one or more first constraints, the first threshold value, the one or more second constraints, and the second threshold value," as recited in Claim 1. Furthermore, in attempting to apply *Lupien* to Claim 1, the Examiner did not even attempt to cite to any portion of *Lupien* as disclosing "the global solution comprising a first objective value for the at least one first objective and a second objective value for the at least one second objective," as recited in Claim 1. (*See* Office Action, Page 2)

Thus, beyond the glaring deficiencies discussed above with respect to the first and second excesses and the fairness criterion recited in Claim 1, *Lupien* (and therefore the proposed *Lupien-Thiessen* combination) fails to disclose, teach, or suggest various other basic elements recited in Claim 1, making *Lupien* wholly inadequate as a primary reference against Claim 1.

For at least these reasons, Appellant respectfully submits that the proposed *Lupien-Thiessen* combination clearly fails to disclose, teach, or suggest various limitations recited in independent Claim 1. For at least analogous reasons, Appellant respectfully submits that the proposed *Lupien-Thiessen* combination clearly fails to disclose, teach, or suggest various limitations recited in independent Claims 17 and 33. Appellant respectfully submits that independent Claims 1, 17, and 33 and their dependent claims are allowable for at least these reasons.

2. The Proposed *Lupien-Thiessen* Combination is Improper

Appellant respectfully submits that the Examiner has not demonstrated the required teaching, suggestion, or motivation in *Lupien*, *Thiessen*, or knowledge generally available to one of ordinary skill in the art at the time of Appellant's invention to combine or modify these references in the manner the Examiner proposes. Thus, Appellant respectfully submits that the proposed *Lupien-Thiessen* combination is improper and that Appellant's claims are allowable for at least this additional reason.

Appellant respectfully directs the Board's attention to the heavy burden incumbent on the Examiner for demonstrating a *prima facie* case of obviousness, discussed above in Section I.B. Appellant respectfully submits that the Examiner has not met this burden.

With regard to the proposed *Lupien-Thiessen* combination, the Examiner stated, "It would have been obvious to one of ordinary skill in the art to modify the method of Lupien et al. by dividing excess satisfaction in order to assure users of an equitable marketplace." (Final Office Action, Page 3) Appellant first notes that the concept of "excess satisfaction" is not even discussed in *Lupien*, which even the Examiner essentially acknowledges. (*See* Final Office Action, Pages 2-3, at which the Examiner does not cite to any portions of *Lupien* as disclosing "excess satisfaction") For this reason alone, Appellant respectfully submits that the Examiner's purported motivation for combining these references is highly presumptive. Moreover, nothing in *Lupien* or *Thiessen* teaches, suggests, or motivates the proposed combination, nor has the Examiner provided specific evidence that purportedly teaches, suggests, or motivates the proposed combination. Merely reciting an alleged advantage that might be achieved by combining the teachings of two references (assuming that combination is even technologically possible) is insufficient to demonstrate the required teaching, suggestion, or motivation to combine references under the M.P.E.P. and governing Federal Circuit decisions.

Additionally, Appellant respectfully notes, "[T]he factual inquiry whether to combine references must be thorough and searching." *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1351-52, 60 U.S.P.Q.2d 1001, 1008 (Fed. Cir. 2001). Thus, the burden is on the Examiner to identify concrete evidence in the record to support his conclusion that it would have been obvious to modify the teachings of the cited references to achieve the claimed invention. *See, In re Kotzab*, 217 F.3d 1365, 1370, 55 U.S.P.Q.2d 1313, 1316-17 (Fed. Cir. 2000). The Examiner's conclusory assertion that it would have been obvious to combine *Lupien* with *Thiessen* fails to provide a thorough and searching factual inquiry and does not identify any concrete evidence in the record for combining these references in the manner proposed by the Examiner.

Accordingly, since the prior art fails to provide the required teaching, suggestion, or motivation to combine *Lupien* with *Thiessen* in the manner the Examiner proposes, Appellant respectfully submits that the Examiner's conclusions set forth in the Final Office Action fall well short of the requirements set forth in the M.P.E.P. and the governing Federal Circuit case law for demonstrating a *prima facie* case of obviousness. Thus, Appellant respectfully

submits that the Examiner's proposed modification of *Lupien* with alleged teachings of *Thiessen* appears to be merely an attempt, in hindsight and with the benefit of Appellant's claims as a blueprint, to reconstruct Appellant's claims and is unsupported by the teachings of *Lupien* or *Thiessen*.

For at least these reasons, Appellant respectfully submits that the proposed *Lupien-Thiessen* combination is improper and fails to support a *prima facie* case of obviousness. Appellant respectfully submits that independent Claims 1, 17, and 33 and their dependent claims are allowable for at least this additional reason.

3. Conclusion Regarding Group 1

For at least these reasons, the proposed *Lupien-Thiessen* combination fails to support the obviousness rejection of independent Claim 1 and its dependent claims. For at least analogous reasons, the proposed *Lupien-Thiessen* combination fails to support the obviousness rejection of independent Claims 17 and 33 and their dependent claims. These claims are therefore patentable over the proposed *Lupien-Thiessen* combination. Appellant respectfully submits that these rejections are improper and should be reversed by the Board.

D. Group 2 (Claims 11-12, 27-28, and 43-44)

Claims 11-12, 27-28, and 43-44 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the proposed *Lupien-Thiessen* combination. Appellant respectfully submits that these claims are clearly patentable over the proposed *Lupien-Thiessen* combination. Thus, Appellant respectfully submits that these rejections are improper and should be reversed by the Board.

Claims 11-12, 27-28, and 43-44 are separately patentable from every other claim subject to the same ground of rejection. These claims recite limitations that are substantially different from limitations recited in the claims of other groups and cannot be properly grouped with the claims of other groups for purposes of this Appeal. For example, these claims recite patentable distinctions over the prior art beyond those recited in independent Claims 1, 17, and 33.

Dependent Claims 11-12, 27-28, and 43-44 depend from independent Claims 1, 17, and 33, respectively, which Appellant has shown above to be clearly patentable over the proposed *Lupien-Thiessen* combination, and are allowable for at least this reason. Furthermore, in addition to those reasons discussed above with reference to independent Claims 1, 17, and 33, dependent Claims 11-12, 27-28, and 43-44 recite further patentable distinctions over the proposed *Lupien-Thiessen* combination.

For example, neither *Lupien* nor *Thiessen* discloses, teaches, or suggests receiving "filtering information from the first party and the second party" and using "the filtering information to determine one or more filtered global solutions from among the global solutions according to a filtering approach," as recited in Claims 11, 27, and 43. The Examiner stated that *Thiessen* discloses "communicating possible alternative solutions to the parties, and receiving and applying filtering information comprising a weighted preferences approach from the parties," that *Thiessen* does not disclose "accomplishing these steps after computation of the global solution," but that "it would have been an obvious matter of design choice to modify the method of Thiessen by accomplishing the filtering steps after the global solution has been computed since applicant does not state that accomplishing the filtering in this manner at this time if for any particular reason . . . and it appears that the method would work equally well in either configuration." (Final Office Action, Page 4)

First, Appellant respectfully notes that a conclusory statement, necessarily involving speculation in hindsight with the benefit of Appellant's claims as a blueprint, that "it would have been an obvious matter of design choice" is insufficient under the M.P.E.P. and governing Federal Circuit case law.

Second, contrary to the Examiner's assertions, Appellant's Specification explicitly provides one or more reasons for receiving "filtering information from the first party and the second party" and using "the filtering information to determine one or more filtered global solutions from among the global solutions according to a filtering approach," as recited in Claims 11, 27, and 43. For example, as explicitly described in the Specification, a solution filtering stage 56 may be performed "to discard any unacceptable discovered global solutions 54 and generate a set of one or more filtered solutions 58" and to allow a solution selection

stage 60 "to select a single global solution 54 from among the filtered solutions 58 and generate a set of one or more selected solutions 62." (Page 8, Lines 23-26) It is axiomatic that filtering of global solutions must be performed after the global solutions have been generated. Furthermore, also as explicitly described in the Specification, filtering stage 56 may allow parties 12 to, for example: (1) veto global solutions 54; (2) rank global solutions 54 such that global solution 54 lacking Pareto-optimal rankings are discarded; (3) provide values for global solutions 54 indicating the relative strength of their preferences for global solutions 54 such that global solutions 54 that optimize the total weight are determined and remaining global solutions 54 are discarded; and (4) combine two or more of the above. (Page 11, Lines 3-12) Aspects relating to these alternatives are recited in Claims 12, 28, and 44, which depend on Claims 11, 27, and 43, respectively.

Moreover, Appellant respectfully submits that there is no required teaching, suggestion, or motivation to modify *Thiessen* (or *Lupien*) to include the recited features, if such were even possible, especially in light of the stringent standards for doing so under the M.P.E.P. and governing Federal Circuit case law.

For at least these reasons, the proposed *Lupien-Thiessen* combination fails support the obviousness rejection of dependent Claims 11-12, 27-28, and 43-44. These claims are therefore patentable over the proposed *Lupien-Thiessen* combination. Appellant respectfully submits that these rejections are improper and should be reversed by the Board.

E. Group 3 (Claims 13-14, 29-30, 45-46, and 48-50)

Claims 13-14, 29-30, 45-46, and 48-50 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the proposed *Lupien-Thiessen* combination. Appellant respectfully submits that these claims are clearly patentable over the proposed *Lupien-Thiessen* combination. Thus, Appellant respectfully submits that these rejections are improper and should be reversed by the Board.

Claims 13-14, 29-30, 45-46, and 48-50 are separately patentable from every other claim subject to the same ground of rejection. These claims recite limitations that are substantially different from limitations recited in the claims of other groups and cannot be

properly grouped with the claims of other groups for purposes of this Appeal. For example, these claims recite patentable distinctions over the prior art beyond those recited in independent Claims 1, 17, and 33.

Dependent Claims 13-14 and 48 (which depend from independent Claim 1), dependent Claims 29-30 and 49 (which depend from independent Claim 17), and dependent Claims 45-46 and 50 (which depend from independent Claim 33), depend from independent claims that Appellant has shown above to be clearly patentable over the proposed *Lupien-Thiessen* combination, and are allowable for at least this reason. Furthermore, in addition to those reasons discussed above with reference to independent Claims 1, 17, and 33, dependent Claims 13-14, 29-30, 45-46, and 48-50 recite further patentable distinctions over the proposed *Lupien-Thiessen* combination.

For example, neither *Lupien* nor *Thiessen* discloses, teaches, or suggests using "the selection information to determine a selected global solution from among the communicated global solutions according to a selection approach," as recited in Claims 13, 29, and 45, or the selection approach being selected from the group consisting of "an auction approach" and "a random selection approach," as recited in Claims 14, 30, and 46. The Examiner admitted that *Thiessen* "does not disclose choosing the solution via an auction approach." (Final Office Action, Page 4) Appellant respectfully submits that there is no teaching, suggestion, or motivation to modify *Thiessen* (or *Lupien*) to include these features, if such were even possible, especially in light of the stringent standards for doing so set forth above. Appellant again respectfully notes that a conclusory statement, necessarily involving speculation in hindsight with the benefit of Appellant's claims as a blueprint, that "it would have been obvious" is insufficient under the M.P.E.P. and governing Federal Circuit case law.

For at least these reasons, the proposed *Lupien-Thiessen* combination fails support the obviousness rejection of dependent Claims 13-14, 29-30, 45-46, and 48-50. These claims are therefore patentable over the proposed *Lupien-Thiessen* combination. Appellant respectfully submits that these rejections are improper and should be reversed by the Board.

II. The Claims are Patentable over the Proposed *Thiessen-Lupien* Combination

A. Overview

Claims 1-3, 5-7, 10-15, 17-19, 21-23, 26-31, 33-35, 37-39, and 42-50 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the Examiner's proposed *Thiessen-Lupien* combination, with *Thiessen* as the primary reference. Appellant respectfully submits that the Examiner's proposed *Thiessen-Lupien* combination fails to support the obviousness rejections of Claims 1-3, 5-7, 10-15, 17-19, 21-23, 26-31, 33-35, 37-39, and 42-50. Appellant respectfully submits that these rejections are therefore improper and should be reversed by the Board.

B. Standard

Appellant respectfully directs the Board's attention to Section I.B above, which discusses the heavy burden incumbent on the Examiner for demonstrating a *prima-facie* case of obviousness.

C. Group 1 (Claims 1-3, 5-7, 10, 15, 17-19, 21-23, 26, 31, 33-35, 37-39, 42, and 47)

Claims 1-3, 5-7, 10, 15, 17-19, 21-23, 26, 31, 33-35, 37-39, 42, and 47 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the proposed *Thiessen-Lupien* combination. Appellant respectfully submits that these claims are clearly patentable over the proposed *Thiessen-Lupien* combination. Thus, Appellant respectfully submits that these rejections are improper and should be reversed by the Board.

Claims 1-3, 5-7, 10, 15, 17-19, 21-23, 26, 31, 33-35, 37-39, 42, and 47 are separately patentable from every other claim subject to the same ground of rejection. These claims recite limitations that are substantially different from limitations recited in other claims. In addition, claims excluded from Group 1 that are subject to the same ground of rejection and that depend on independent Claims 1, 17, and 33, respectively, recite patentable distinctions over the prior art beyond those recited in independent Claims 1, 17, and 33 and cannot be properly grouped with independent Claims 1, 17, and 33 for purposes of this Appeal.

Appellant respectfully submits that the Examiner's proposed *Thiessen-Lupien* combination fails to support the obviousness rejections for at least two reasons. First, assuming that the proposed *Thiessen-Lupien* combination was proper, the proposed combination would still fail to disclose, teach, or suggest each and every limitation recited in the rejected claims. Second, the proposed *Thiessen-Lupien* combination is improper at least because the required teaching, suggestion, or motivation to combine *Lupien* with *Thiessen* is lacking.

1. The Proposed *Thiessen-Lupien* Combination Fails to Disclose, Teach, or Suggest Various Limitations Recited in Appellant's Claims

Appellant respectfully submits that the proposed *Thiessen-Lupien* combination fails to disclose, teach, or suggest various limitations recited in Appellant's claims. Thus, Appellant respectfully submits that Appellant's claims are allowable for at least this reason.

To avoid burdening the record, Appellant respectfully directs the Boards attention to Section I.C.1 above, which discusses example deficiencies of the Examiner's proposed *Lupien-Thiessen* combination vis-à-vis Appellant's independent Claim 1. These deficiencies exist whether *Lupien* or *Thiessen* is considered the primary reference.

For example, Appellant reiterates that *Thiessen* fails to disclose, teach, or suggest at least the following limitations recited in independent Claim 1, for example:

> ***the global solution representing a first excess between the first objective value and the first threshold value and a second excess between the second objective value and the second threshold value, the global solution being generated considering a fairness criterion specifying one of the following:***
>
> ***that the first excess must equal the second excess, the fairness criterion comprising an equal distribution criterion;***
>
> ***that a ratio of the first excess to the second excess must equal a ratio of the first threshold value to the second threshold value, the fairness criterion comprising a geometric distribution criterion;***
>
> ***that a ratio of the first excess to the second excess must equal a ratio of a first weight for the first party to a second weight for the second party, the fairness criterion comprising a weighted distribution criterion; and***
>
> ***that a ratio of the first objective value to the first threshold value must equal a first weight for the first party and a ratio of the second***

objective value to the second threshold value must equal a second weight for the second party, the fairness criterion comprising a weighted geometric distribution criterion.

The Examiner acknowledged that *Lupien* fails to teach these limitations. (*See* Final Office Action, Page 2) Thus, the proposed *Thiessen-Lupien* combination clearly fails to disclose, teach, or suggest these limitations.

Additionally, the Examiner acknowledged that "Thiessen does not explicitly show the first constraint related to the first objective, the second constraint related to the second objective, or that the first and second objective values of the global solution are consistent with the first and second constraints." (Final Office Action, Page 5) However, the Examiner argued that *Lupien* does show these limitations. As discussed above in Section I.C.1, Appellant respectfully submits that the Examiner's attempted equation of stock price as disclosed in *Lupien* with the one or more first constraints and the one or more second constraints recited in Claim 1 collapses under scrutiny. Thus, *Lupien* clearly fails to make up for at least these acknowledged deficiencies of *Thiessen*.

For at least these reasons, Appellant respectfully submits that the proposed *Thiessen-Lupien* combination clearly fails to disclose, teach, or suggest various limitations recited in independent Claim 1. For at least analogous reasons, Appellant respectfully submits that the proposed *Thiessen-Lupien* combination clearly fails to disclose, teach, or suggest various limitations recited in independent Claims 17 and 33. Appellant respectfully submits that independent Claims 1, 17, and 33 and their dependent claims are allowable for at least these reasons.

2. The Proposed *Thiessen-Lupien* Combination is Improper

Appellant respectfully submits that the Examiner has not demonstrated the required teaching, suggestion, or motivation in *Thiessen*, *Lupien*, or in the knowledge generally available to one of ordinary skill in the art at the time of Appellant's invention to combine or modify these references in the manner the Examiner proposes. Thus, Appellant respectfully submits that the proposed *Thiessen-Lupien* combination is improper and that Appellant's claims are allowable for at least this additional reason.

Appellant respectfully directs the Board's attention to the heavy burden incumbent on the Examiner for demonstrating a *prima facie* case of obviousness, discussed above in Section I.B. Appellant respectfully submits that the Examiner has not met this burden.

With regard to the proposed *Thiessen-Lupien* combination as applied to independent Claim 1, the Examiner acknowledged that *Thiessen* "does not show the first constraint related to the first objective, the second constraint related to the second objective, or that the first and second objective values of the global solution are consistent with the first and second constraints." (Final Office Action, Page 5) However, the Examiner argued that *Lupien* does disclose these limitations and stated, "It would have been obvious to one of ordinary skill in the art to modify the method of Thiessen by introducing the first and second constraints and having the global solution be consistent with those constraints in order to allow a plurality of variables to be considered and satisfied at one time." (Final Office Action, Page 5) Appellant respectfully submits that nothing in *Thiessen* or *Lupien* teaches, suggests, or motivates the proposed combination, nor has the Examiner provided specific evidence that purportedly teaches, suggests, or motivates the proposed combination. Merely reciting an alleged advantage that might be achieved by combining the teachings of two references (assuming that combination is even technologically possible) is insufficient to demonstrate the required teaching, suggestion, or motivation to combine references under the M.P.E.P. and governing Federal Circuit decisions.

Additionally, Appellant respectfully notes, "[T]he factual inquiry whether to combine references must be thorough and searching." *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1351-52, 60 U.S.P.Q.2d 1001, 1008 (Fed. Cir. 2001). Thus, the burden is on the Examiner to identify concrete evidence in the record to support his conclusion that it would have been obvious to modify the teachings of the cited references to achieve the claimed invention. *See, In re Kotzab*, 217 F.3d 1365, 1370, 55 U.S.P.Q.2d 1313, 1316-17 (Fed. Cir. 2000). The Examiner's conclusory assertion that it would have been obvious to combine *Thiessen* with *Lupien* fails to provide a thorough and searching factual inquiry and does not identify any concrete evidence in the record for combining these references in the manner proposed by the Examiner.

Accordingly, since the prior art fails to provide the required teaching, suggestion, or motivation to combine *Thiessen* with *Lupien* in the manner the Examiner proposes, Appellant respectfully submits that the Examiner's conclusions set forth in the Final Office Action fall well short of the requirements set forth in the M.P.E.P. and the governing Federal Circuit case law for demonstrating a *prima facie* case of obviousness. Thus, Appellant respectfully submits that the Examiner's proposed modification of *Thiessen* with alleged teachings of *Lupien* appears to be merely an attempt, in hindsight and with the benefit of Appellant's claims as a blueprint, to reconstruct Appellant's claims and is unsupported by the teachings of *Thiessen* or *Lupien*.

For at least these reasons, Appellant respectfully submits that the proposed *Thiessen-Lupien* combination is improper and fails to support a *prima facie* case of obviousness. Appellant respectfully submits that independent Claims 1, 17, and 33 and their dependent claims are allowable for at least this additional reason.

3. Conclusion Regarding Group 1

For at least these reasons, the proposed *Thiessen-Lupien* combination fails support the obviousness rejection of independent Claim 1 and its dependent claims. For at least analogous reasons, the proposed *Thiessen-Lupien* combination fails to support the obviousness rejection of independent Claims 17 and 33 and their dependent claims. These claims are therefore patentable over the proposed *Thiessen-Lupien* combination. Appellant respectfully submits that these rejections are improper and should be reversed by the Board.

D. Group 2 (Claims 11-12, 27-28, and 43-44)

Claims 11-12, 27-28, and 43-44 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the proposed *Thiessen-Lupien* combination. Appellant respectfully submits that these claims are clearly patentable over the proposed *Thiessen-Lupien* combination. Thus, Appellant respectfully submits that these rejections are improper and should be reversed by the Board.

Claims 11-12, 27-28, and 43-44 are separately patentable from every other claim subject to the same ground of rejection. These claims recite limitations that are substantially

different from limitations recited in the claims of other groups and cannot be properly grouped with the claims of other groups for purposes of this Appeal. For example, these claims recite patentable distinctions over the prior art beyond those recited in independent Claims 1, 17, and 33.

Dependent Claims 11-12, 27-28, and 43-44 depend from independent Claims 1, 17, and 33, respectively, which Appellant has shown above to be clearly patentable over the proposed *Thiessen-Lupien* combination, and are allowable for at least this reason. Furthermore, in addition to those reasons discussed above with reference to independent Claims 1, 17, and 33, dependent Claims 11-12, 27-28, and 43-44 recite further patentable distinctions over the proposed *Thiessen-Lupien* combination.

The Examiner's basis for rejecting Claims 11-12, 27-28, and 43-44 based on the proposed *Thiessen-Lupien* combination (*see* Final Office Action, Pages 6-7) was substantially the same as the Examiner's basis for rejecting these claims based on the proposed *Lupien-Thiessen* combination (*see* Final Office Action, Page 4). Thus, to avoid burdening the record, Appellant respectfully directs the Board's attention to Section I.D above, which establishes the clear allowability of Claims 11-12, 27-28, and 43-44 over the combination of *Thiessen* and *Lupien*, regardless of which reference is considered the primary reference.

For at least these reasons, the proposed *Thiessen-Lupien* combination fails support the obviousness rejection of dependent Claims 11-12, 27-28, and 43-44. These claims are therefore patentable over the proposed *Thiessen-Lupien* combination. Appellant respectfully submits that these rejections are improper and should be reversed by the Board.

E. Group 3 (Claims 13-14, 29-30, 45-46, and 48-50)

Claims 13-14, 29-30, 45-46, and 48-50 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the proposed *Lupien-Thiessen* combination. Appellant respectfully submits that these claims are clearly patentable over the proposed *Lupien-Thiessen* combination. Thus, Appellant respectfully submits that these rejections are improper and should be reversed by the Board.

Claims 13-14, 29-30, 45-46, and 48-50 are separately patentable from every other claim subject to the same ground of rejection. These claims recite limitations that are substantially different from limitations recited in the claims of other groups and cannot be properly grouped with the claims of other groups for purposes of this Appeal. For example, these claims recite patentable distinctions over the prior art beyond those recited in independent Claims 1, 17, and 33.

Dependent Claims 13-14 and 48 (which depend from independent Claim 1), dependent Claims 29-30 and 49 (which depend from independent Claim 17), and dependent Claims 45-46 and 50 (which depend from independent Claim 33), depend from independent claims which Appellant has shown above to be clearly patentable over the proposed *Lupien-Thiessen* combination, and are allowable for at least this reason. Furthermore, in addition to those reasons discussed above with reference to independent Claims 1, 17, and 33, dependent Claims 13-14, 29-30, 45-46, and 48-50 recite further patentable distinctions over the proposed *Lupien-Thiessen* combination.

The Examiner's basis for rejecting Claims 13-14, 29-30, 45-46, and 48-50 based on the proposed *Thiessen-Lupien* combination (*see* Final Office Action, Page 7) was substantially the same as the Examiner's basis for rejecting these claims based on the proposed *Lupien-Thiessen* combination (*see* Final Office Action, Page 4). Thus, to avoid burdening the record, Appellant respectfully directs the Board's attention to Section I.E above, which establishes the clear allowability of Claims 13-14, 29-30, 45-46, and 48-50 over the combination of *Thiessen* and *Lupien*, regardless of which reference is considered the primary reference.

For at least these reasons, the proposed *Thiessen-Lupien* combination fails support the obviousness rejection of dependent Claims 13-14, 29-30, 45-46, and 48-50. These claims are therefore patentable over the proposed *Thiessen-Lupien* combination. Appellant respectfully submits that these rejections are improper and should be reversed by the Board.

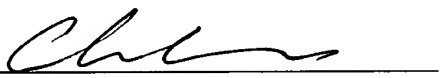
Conclusion

Appellant has demonstrated that, for at least the foregoing reasons, the present invention, as claimed, is clearly patentably distinguishable over the prior art cited by the Examiner. Therefore, Appellant respectfully requests the Board to reverse the final rejection of the Examiner and instruct the Examiner to issue a Notice of Allowance of all pending claims.

Appellant has enclosed a check in the amount of $500.00 for this Appeal Brief and a check in the amount of $1,020.00 for the cost of a three-month extension of time for filing the Appeal Brief. Although Appellant believes no other fees are due, the Commissioner is hereby authorized to charge any additional fees and credit any overpayments to Deposit Account No. 02-0384 of Baker Botts L.L.P.

Respectfully submitted,

BAKER BOTTS L.L.P.
Attorneys for Appellant



Christopher W. Kennerly
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Date: December 27, 2004

Customer Number: **05073**

Appendix A

1. (Previously Presented) A computer-implemented system for multi-party constrained optimization, the system comprising one or more processing units and one or more memory units collectively operable to:

access a first optimization problem and a first threshold value corresponding to a first party to a negotiation, the first optimization problem comprising at least one first objective to which the first threshold value relates and one or more first constraints to which the at least one first objective relates;

access a second optimization problem and a second threshold value corresponding to a second party to the negotiation, the second optimization problem comprising at least one second objective to which the second threshold value relates and one or more second constraints to which the at least one second objective relates;

generate a global solution to a global optimization problem, the global solution comprising a first objective value for the at least one first objective and a second objective value for the at least one second objective such that the first and second objective values are consistent with value the one or more first constraints, the first threshold value, the one or more second constraints, and the second threshold value, the global solution representing a first excess between the first objective value and the first threshold value and a second excess between the second objective value and the second threshold value, the global solution being generated considering a fairness criterion specifying one of the following:

that the first excess must equal the second excess, the fairness criterion comprising an equal distribution criterion;

that a ratio of the first excess to the second excess must equal a ratio of the first threshold value to the second threshold value, the fairness criterion comprising a geometric distribution criterion;

that a ratio of the first excess to the second excess must equal a ratio of a first weight for the first party to a second weight for the second party, the fairness criterion comprising a weighted distribution criterion; and

that a ratio of the first objective value to the first threshold value must equal a first weight for the first party and a ratio of the second objective value to the second threshold

value must equal a second weight for the second party, the fairness criterion comprising a weighted geometric distribution criterion.

2. (Previously Presented) The system of Claim 1, wherein the first optimization problem is received from the first party and comprises at least a portion of a constrained optimization problem (COP) for the first party, the COP comprising at least the first objective.

3. (Previously Presented) The system of Claim 2, wherein the COP further comprises at least one constraint relating to one or more global variables.

4. (Canceled)

5. (Previously Presented) The system of Claim 1, wherein the global optimization problem comprises a linear programming (LP) problem.

6. (Previously Presented) The system of Claim 1, wherein the first objective value exceeds the first threshold value and the second objective value exceeds the second threshold value.

7. (Previously Presented) The system of Claim 1, further operable to generate the global solution as a Pareto-optimal solution.

8. (Canceled)

9. (Canceled)

10. (Previously Presented) The system of Claim 1, further operable to access an additional first threshold value for the first party, access an additional second threshold value for the second party, and generate an additional global solution satisfying the additional first threshold value and the additional second threshold value.

11. (Previously Presented) The system of Claim 1, further operable to:

communicate one or more global solutions to the first party and the second party;

receive filtering information from the first party and the second party;

use the filtering information to determine one or more filtered global solutions from among the global solutions according to a filtering approach.

12. (Previously Presented) The system of Claim 11, wherein the filtering approach is selected from the group consisting of:

a veto approach;

a Pareto-optimal ranking approach;

an optimal weighted preferences approach; and

a mixed approach combining two or more of the above.

13. (Previously Presented) The system of Claim 1, further operable to:

communicate one or more global solutions to the first party and the second party;

receive selection information from the first party and the second party; and

use the selection information to determine a selected global solution from among the communicated global solutions according to a selection approach.

14. (Previously Presented) The system of Claim 13, wherein the selection approach is selected from the group consisting of:

an auction approach; and

a random selection approach.

15. (Previously Presented) The system of Claim 1, further operable to mediate at least a portion of a negotiation between the first party and a third party substantially simultaneously with the negotiation between the first party and the second party.

16. (Canceled)

17. (Previously Presented) A computer-implemented method for multi-party constrained optimization, the method performed using a computer system comprising one or more processing units and one or more memory units, the method comprising:

using the computer system, accessing a first optimization problem and a first threshold value corresponding to a first party to a negotiation, the first optimization problem comprising at least one first objective to which the first threshold value relates and one or more first constraints to which the at least one first objective relates;

using the computer system, accessing a second optimization problem and a second threshold value corresponding to a second party to the negotiation, the second optimization problem comprising at least one second objective to which the second threshold value relates and one or more second constraints to which the at least one second objective relates; and

using the computer system, generating a global solution to a global optimization problem, the global solution comprising a first objective value for the at least one first objective and a second objective value for the at least one second objective such that the first and second objective values are consistent with the one or more first constraints, the first threshold value, the one or more second constraints, and the second threshold value, the global solution comprising an option for resolving the computer-implemented multi-party negotiation, the global solution representing a first excess between the first objective value and the first threshold value and a second excess between the second objective value and the second threshold value, the global solution being generated considering a fairness criterion specifying one of the following:

that the first excess must equal the second excess, the fairness criterion comprising an equal distribution criterion;

that a ratio of the first excess to the second excess must equal a ratio of the first threshold value to the second threshold value, the fairness criterion comprising a geometric distribution criterion;

that a ratio of the first excess to the second excess must equal a ratio of a first weight for the first party to a second weight for the second party, the fairness criterion comprising a weighted distribution criterion; and

that a ratio of the first objective value to the first threshold value must equal a first weight for the first party and a ratio of the second objective value to the second threshold

value must equal a second weight for the second party, the fairness criterion comprising a weighted geometric distribution criterion.

18. (Original) The method of Claim 17, further comprising receiving the first optimization problem from the first party, the first optimization problem comprising at least a portion of a constrained optimization problem (COP) for the first party, the COP comprising at least the first objective.

19. (Original) The method of Claim 18, wherein the COP further comprises at least one constraint relating to one or more global variables.

20. (Canceled)

21. (Previously Presented) The method of Claim 17, wherein the global optimization problem comprises a linear programming (LP) problem.

22. (Previously Presented) The method of Claim 17, wherein the first objective value exceeds the first threshold value and the second objective value exceeds the second threshold value.

23. (Previously Presented) The method of Claim 17, wherein the global solution is generated as a Pareto-optimal solution.

24. (Canceled)

25. (Canceled)

26. (Previously Presented) The method of Claim 17, further comprising:

accessing an additional first threshold value for the first party;

accessing an additional second threshold value for the second party; and

generating an additional global solution satisfying the additional first threshold value and the additional second threshold value.

27. (Previously Presented) The method of Claim 17, further comprising:

communicating one or more global solutions to the first party and the second party;

receiving filtering information from the first party and the second party;

using the filtering information to determine one or more filtered global solutions from among the global solutions according to a filtering approach.

28. (Original) The method of Claim 27, wherein the filtering approach is selected from the group consisting of:

a veto approach;

a Pareto-optimal ranking approach;

an optimal weighted preferences approach; and

a mixed approach combining two or more of the above.

29. (Previously Presented) The method of Claim 17, further comprising:

communicating one or more global solutions to the first party and the second party;

receiving selection information from the first party and the second party;

use the selection information to determine a selected global solution from among the communicated global solutions according to a selection approach.

30. (Original) The method of Claim 29, wherein the selection approach is selected from the group consisting of:

an auction approach; and

a random selection approach.

31. (Original) The method of Claim 17, further comprising mediating at least a portion of a negotiation between the first party and a third party substantially simultaneously with the negotiation between the first party and the second party.

32. (Canceled)

33. (Previously Presented) Software for multi-party constrained optimization, the software embodied in a computer-readable medium and operable to, when executed using a computer system comprising one or more processing units and one or more memory units:

access a first optimization problem and a first threshold value corresponding to a first party to a negotiation, the first optimization problem comprising at least one first objective to which the first threshold value relates and one or more first constraints to which the at least one first objective relates;

access a second optimization problem and a second threshold value corresponding to a second party to the negotiation, the second optimization problem comprising at least one second objective to which the second threshold value relates and one or more second constraints to which the at least one second objective relates;

generate a global solution to a global optimization problem, the global solution comprising a first objective value for the at least one first objective and a second objective value for the at least one second objective such that the first and second objective values are consistent with the one or more first constraints, the first threshold value, the one or more second constraints, and the second threshold value, the global solution comprising an option for resolving the computer-implemented multi-party negotiation, the global solution representing a first excess between the first objective value and the first threshold value and a second excess between the second objective value and the second threshold value, the global solution being generated considering a fairness criterion specifying one of the following:

that the first excess must equal the second excess, the fairness criterion comprising an equal distribution criterion;

that a ratio of the first excess to the second excess must equal a ratio of the first threshold value to the second threshold value, the fairness criterion comprising a geometric distribution criterion;

that a ratio of the first excess to the second excess must equal a ratio of a first weight for the first party to a second weight for the second party, the fairness criterion comprising a weighted distribution criterion; and

that a ratio of the first objective value to the first threshold value must equal a first weight for the first party and a ratio of the second objective value to the second threshold value must equal a second weight for the second party, the fairness criterion comprising a weighted geometric distribution criterion.

34. (Original) The software of Claim 33, wherein the first optimization problem is received from the first party and comprises at least a portion of a constrained optimization problem (COP) for the first party, the COP comprising at least the first objective.

35. (Original) The software of Claim 34, wherein the COP further comprises at least one constraint relating to one or more global variables.

36. (Canceled)

37. (Previously Presented) The software of Claim 33, wherein the global optimization problem comprises a linear programming (LP) problem.

38. (Previously Presented) The software of Claim 33, wherein the first objective value exceeds the first threshold value, and the second objective value exceeds the second threshold value.

39. (Original) The software of Claim 33, further operable to generate the global solution as a Pareto-optimal solution.

40. (Canceled)

41. (Canceled)

42. (Previously Presented) The software of Claim 33, further operable to access an additional first threshold value from the first party, access an additional second threshold value from the second party, and generate an additional global solution satisfying the additional first threshold value and the additional second threshold value.

43. (Previously Presented) The software of Claim 33, further operable to:

communicate one or more global solutions to the first party and the second party;

receive filtering information from the first party and the second party;

use the filtering information to determine one or more filtered global solutions from among the global solutions according to a filtering approach.

44. (Original) The software of Claim 43, wherein the filtering approach is selected from the group consisting of:

a veto approach;

a Pareto-optimal ranking approach;

an optimal weighted preferences approach; and

a mixed approach combining two or more of the above.

45. (Previously Presented) The software of Claim 33, further operable to:

communicate one or more global solutions to the first party and the second party;

receive selection information from the first party and the second party;

use the selection information to determine a selected global solution from among the communicated global solutions according to a selection approach.

46. (Original) The software of Claim 45, wherein the selection approach is selected from the group consisting of:

an auction approach; and

a random selection approach.

47. (Original) The software of Claim 33, further operable to mediate at least a portion of a negotiation between the first party and a third party substantially simultaneously with the negotiation between the first party and the second party.

48. (Previously Presented) The system of Claim 13, wherein the one or more communicated global solutions comprise a filtered global solution determined from among one or more global solutions according to a filtering approach using filtering information received from the first and second parties.

49. (Previously Presented) The method of Claim 29, wherein the one or more communicated global solutions comprise a filtered global solution determined from among one or more global solutions according to a filtering approach using filtering information received from the first and second parties.

50. (Previously Presented) The software of Claim 45, wherein the one or more communicated global solutions comprise a filtered global solution determined from among one or more global solutions according to a filtering approach using filtering information received from the first and second parties.

51. (Withdrawn) A computer-implemented method for multi-party constrained optimization, the method performed using a computer system comprising one or more processing units and one or more memory units, the method comprising:

using the computer system, accessing a first optimization problem corresponding to a first party to a negotiation, the first optimization problem comprising at least one first objective and one or more first constraints-to which the first objective relates;

using the computer system, accessing a second optimization problem corresponding to a second party to the negotiation, the second optimization problem comprising at least one second objective and one or more second constraints to which the second objective relates;

using the computer system, determining a first optimal value for the at least one first objective considering the one or more first constraints for the first optimization problem;

using the computer system, determining a second optimal value for the at least one second objective considering the one or more second constraints for the second optimization problem; and

using the computer system, generating a global solution to a global optimization problem such that the global solution is consistent with the at least one first objective, the one or more first constraints, the at least one second objective, and the one or more second

constraints, the global solution comprising an option for resolving the computer-implemented multi-party negotiation, the global solution representing a first excess between the global solution and the first optimal value and a second excess between the global solution and the second optimal value, the global solution being generated considering a fairness criterion specifying that the first excess is to minimally deviate from the first optimal value and that the second excess is to minimally deviate from the second optimal value considering the one or more first constraints and the one or more second constraints.

52. (Withdrawn) The method of Claim 51, further comprising receiving the first optimization problem from the first party, the first optimization problem comprising at least a portion of a constrained optimization problem (COP) for the first party, the COP comprising at least the first objective.

53. (Withdrawn) The method of Claim 52, wherein the COP further comprises at least one constraint relating to one or more global variables.

54. (Withdrawn) The method of Claim 51, wherein the global optimization problem comprises a linear programming (LP) problem.

55. (Withdrawn) The method of Claim 51, further comprising:

accessing one or more first threshold values for the first party;

accessing one or more second threshold values for the second party; and

generating the global solution consistent with the one or more first threshold values and the one or more second threshold values.

56. (Withdrawn) The method of Claim 55, wherein the first objective value exceeds the one or more first threshold values accessed for the first party and the second objective value exceeds the one or more second threshold values accessed for the second party.

57. (Withdrawn) The method of Claim 51, wherein the global solution is generated as a Pareto-optimal solution.

58. (Withdrawn) The method of Claim 51, further comprising:

communicating one or more global solutions to the first party and the second party;

receiving filtering information from the first party and the second party;

using the filtering information to determine one or more filtered global solutions from among the global solutions according to a filtering approach.

59. (Withdrawn) The method of Claim 58, wherein the filtering approach is selected from the group consisting of:

a veto approach;

a Pareto-optimal ranking approach;

an optimal weighted preferences approach; and

a mixed approach combining two or more of the above.

60. (Withdrawn) The method of Claim 51, further comprising:

communicating one or more global solutions to the first party and the second party;

receiving selection information from the first party and the second party;

use the selection information to determine a selected global solution from among the communicated global solutions according to a selection approach.

61. (Withdrawn) The method of Claim 60, wherein the selection approach is selected from the group consisting of:

an auction approach; and

a random selection approach.

62. (Withdrawn) The method of Claim 60, wherein the one or more communicated global solutions comprise a filtered global solution determined from among one or more global solutions according to a filtering approach using filtering information received from the first and second parties.

63. (Withdrawn) The method of Claim 51, further comprising mediating at least a portion of a negotiation between the first party and a third party substantially simultaneously with the negotiation between the first party and the second party